ONTARIO MINISTRY OF ENVIRONMENT
36936000023767

OPERATING SUMMARY

1972

BRANTFORD

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MINISTRY OF THE
ENVIRONMENT

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1972
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TD
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B736
1972

Brantford : water pollution
control plant.

81591

Ontario

Ministry of the
Environment

135 St. Clair Avenue West
Toronto 195, Ontario

We are pleased to present you with the 1972 operating summary for the water pollution control plant serving your community.

This summary contains data on the performance of the plant as well as relevant financial information. Of particular interest is the review of the year's activities in which significant items of these data are discussed in some detail by the operations engineer and his staff who, by their day-to-day involvement with the operation, are thoroughly familiar with the plant.

We appreciate your continuing interest in protecting the environment through the efficient operation of this wastewater treatment facility.

D.S. Caverly
D.S. Caverly,
Assistant Deputy Minister.

D McTavish
D.A. McTavish, P. Eng.,
Director,
Project Operations Branch.

TD
224
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1991
[illegible]

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MINISTRY OF THE ENVIRONMENT

MINISTER
Honourable James A.C. Auld

DEPUTY MINISTER
E. Biggs

ASSISTANT DEPUTY MINISTER
D.S. Caverly

EXECUTIVE DIRECTOR
K.H. Sharpe

PROJECT OPERATIONS BRANCH

DIRECTOR
D.A. McTavish

ASSISTANT DIRECTOR
C.W. Perry

ACTING REGIONAL SUPERVISOR
B.W. Hansler

OPERATIONS ENGINEER
J. Nurmberg

135 St. Clair Avenue West
Toronto 195

BRANTFORD

WATER POLLUTION CONTROL PLANT

operated for

THE CITY OF BRANTFORD

by the

MINISTRY OF THE ENVIRONMENT

1972 ANNUAL OPERATING SUMMARY

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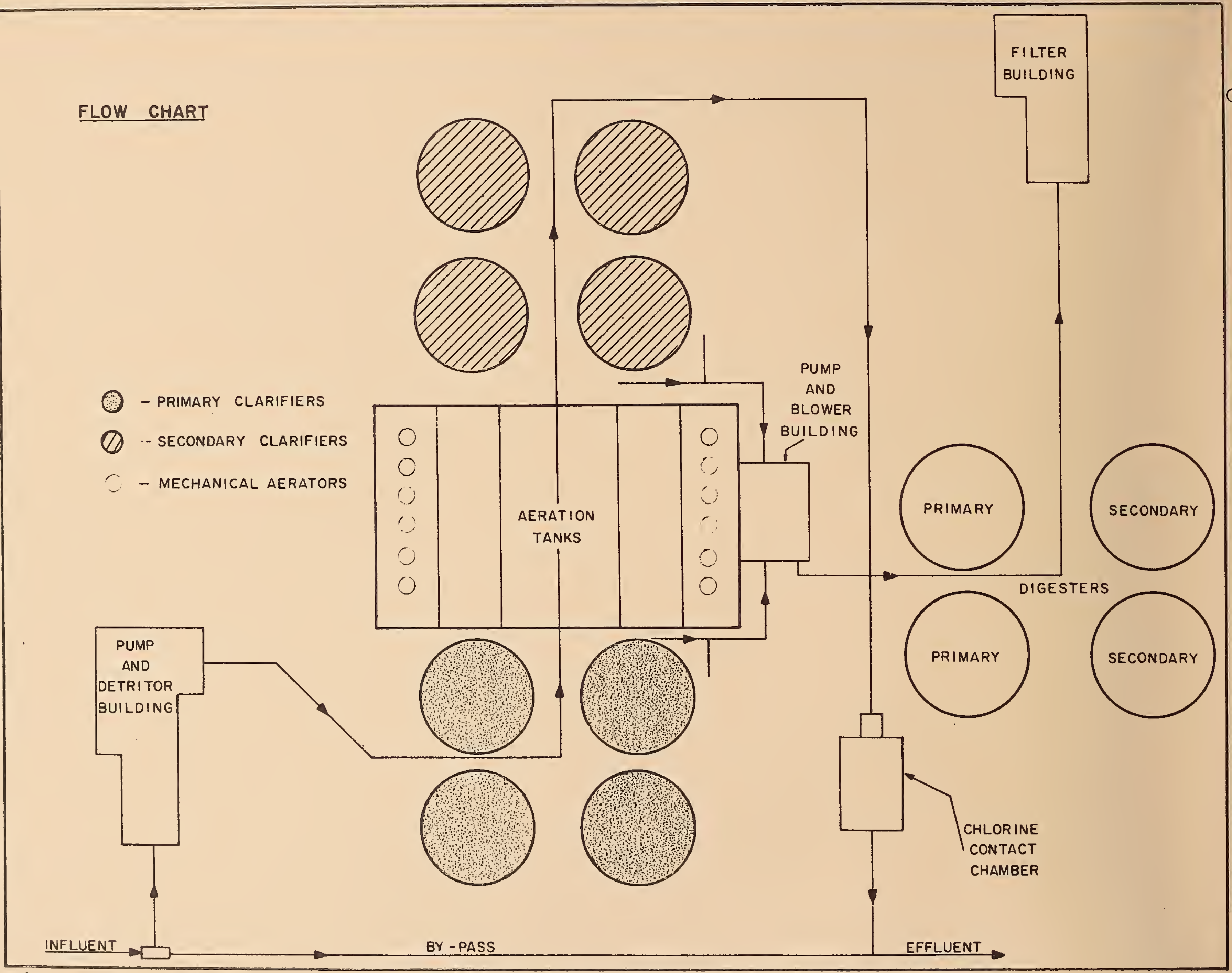
FLOW CHART



FILTER BUILDING
● – PRIMARY CLARIFIERS
▨ – SECONDARY CLARIFIERS
○ – MECHANICAL AERATORS
PUMP AND BLOWER BUILDING
AERATION TANKS
PRIMARY
SECONDARY
DIGESTERS
PRIMARY
SECONDARY
PUMP AND DETRITOR BUILDING
CHLORINE CONTACT CHAMBER
INFLUENT
BY-PASS
EFFLUENT

DESIGN DATA

PROJECT NO.		2-0011-58
TREATMENT		Activated Sludge
DESIGN FLOW		12.5 mgd
DESIGN POPULATION		65,000
BOD	- Raw Sewage	170 mg/l
	- Removal	90%
SS	- Raw Sewage	175 mg/l
	- Removal	90%

PRIMARY TREATMENT

Screening

Type: Coarse bar screens
Size: Two 5 in. spaces

Comminution

Type: Infilco Rotogrator
Size: Two No. 43 (8 mgd ea)

Raw Sewage Pumps

Type: Fairbanks-Morse
Size: Four 3840 gpm ea @ 45' tdh

Grit Removal

Type: Dorr Detritor, Type WA
Size: Two 20' x 20' x 1'-3"
Flow Velocity: 1 fps
Retention: 0.725 min

Primary Sedimentation

Type: Eimco, Type C
Size: Four 70' dia x 10' swd
Retention: 2 hours
Loading: Surface, 812 gal/ft^2/day
Weir, 14,200 gal/ft/day

SECONDARY TREATMENT

Aeration Tanks

Type: Two triple-pass tanks ACM mech aerators in first pass; Diffused air in 2nd and 3rd passes.

Size of pass, 200' x 30' x 15'
Retention: 7.5 hr

Air Supply

Type: Sutorbilt blowers
Size: Three 4300 cfm

Secondary Sedimentation

Type: Eimco, Type C
Size: Four 70' dia x 10' swd
Retention: 2 hr
Loading: Surface, 812 gal/ft^2/day
Weir, 14,200 gal/ft/day

CHLORINATION

Chlorinator

Type: Fischer & Porter Manual adjustment - liquid chlorine evaporator

Chlorine Contact Chamber

Size: 51' x 18' x 7'
Retention: 5 min

OUTFALL

Grand River

SLUDGE HANDLING

Digestion System

Type: Two-stage
Primary: Two 55' dia tanks with two D-O-L mixers each
Volume 49,300 cu ft or 300,000 gal (each tank)
Loading 6.1 lb/ft^3/mo
Secondary: Two 70' dia tanks with Dorr floating covers
Volume 97,200 cu ft or 600,000 gal (each tank)
Total Loading: 2.0 lb/ft^3/mo

Vacuum Filter

Type: Komline-Sanderson coil filters
Size: Two 350 sq ft filters

'72 Review

GENERAL

The modifications to the aeration section and return sludge facilities were completed in 1972.

The brick cladding on the second primary digester also required replacement and the plant staff replaced the cladding with metal siding, completing the work on both digesters.

EXPENDITURES

The 1972 operating cost for the Brantford plant was $281, 125. 99 with an operating cost per million gallons of $80. 40. The cost per pound of BOD removed was 5. 0 cents while cost per pound of suspended solids removed was 3. 6 cents.

PLANT FLOWS and CHLORINATION

The total flow for the year was 3, 498 million gallons with an average daily flow of 9. 6 million gallons.

An average chlorine dosage of 3. 3 mg/l was required to maintain an average 0. 5 mg/l residual in the effluent.

PLANT EFFICIENCY

The average raw sewage BOD of 185 mg/l was approximately 9 percent above the design value of 170 mg/l with this design value being exceeded about 70 percent of the time. The BOD removal efficiency was 80 percent compared to 1971 efficiency of 83 percent, resulting in an average BOD in the effluent of 37 mg/l. The Ministry of the Environment's objective of 15 mg/l was exceeded 75 percent of the time.

The average raw sewage suspended solids concentration of 233 mg/l was approximately 33 percent above the design value of 175 mg/l with the design value being exceeded about 95 percent of the time. The average suspended solids removal efficiency was 90 percent as compared to 88 percent in 1971. The average suspended solids in the effluent was 25 mg/l with the Ministry of the Environment objective of 15 mg/l being exceeded about 75 percent of the time.

SLUDGE DIGESTION & DISPOSAL

A total of 10.986 million gallons of raw sludge was digested in 1972 which is approximately 1 percent more than in 1971 with 49,712 cubic yards being hauled to the disposal field. The raw sludge averaged 7.3 percent total solids, of which 73 percent was volatile matter. The total solids concentration in the digested sludge averaged 4.3 percent of which 66 percent was volatile matter. The average reduction in volatile matter was 48 percent which compares favourably with present criterion.

Without considering equipment depreciation or land rental costs from the City, the average unit annual sludge disposal operating cost was 16.5 cents per cubic yard.

AERATION

The mixed liquor suspended solids concentration averaged 2,520 mg/l and the F/M ratio was 0.23.

During the first half of the year, very low dissolved oxygen concentrations were often recorded.

CONCLUSIONS & RECOMMENDATIONS

The disposal of sludge on the city sludge fields by tank truck continued to be a very economical method of sludge disposal.

After the modifications to the aeration section and return sludge facilities were completed and placed in operation, in August, the effluent quality improved.

It is recommended that expansion of the plant should be considered as the organic loading is reasonably high and the daily hydraulic loading is approaching the design value and capacity of the present plant.

PROJECT COSTS

NET CAPITAL COST	2,250,950.02
Municipal Advances	493,126.02
Long Term Debt to MOE	1,757,824.00
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1972	758,725.64
Net Operating	281,322.82
Debt Retirement	21,379.00
Reserve	11,335.42
Interest Charged	98,576.94
TOTAL	412,614.18

RESERVE ACCOUNT

Balance @ January 1, 1972	124,579.74
Deposited by Municipality	11,335.42
Interest Earned	7,870.36
Less Expenditures	13,237.72
Balance @ December 31, 1972	130,547.80

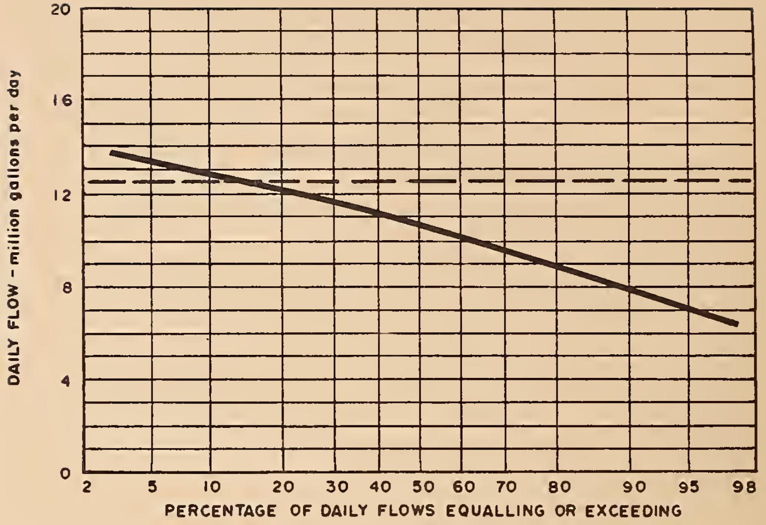
MONTHLY OPERATING COSTS

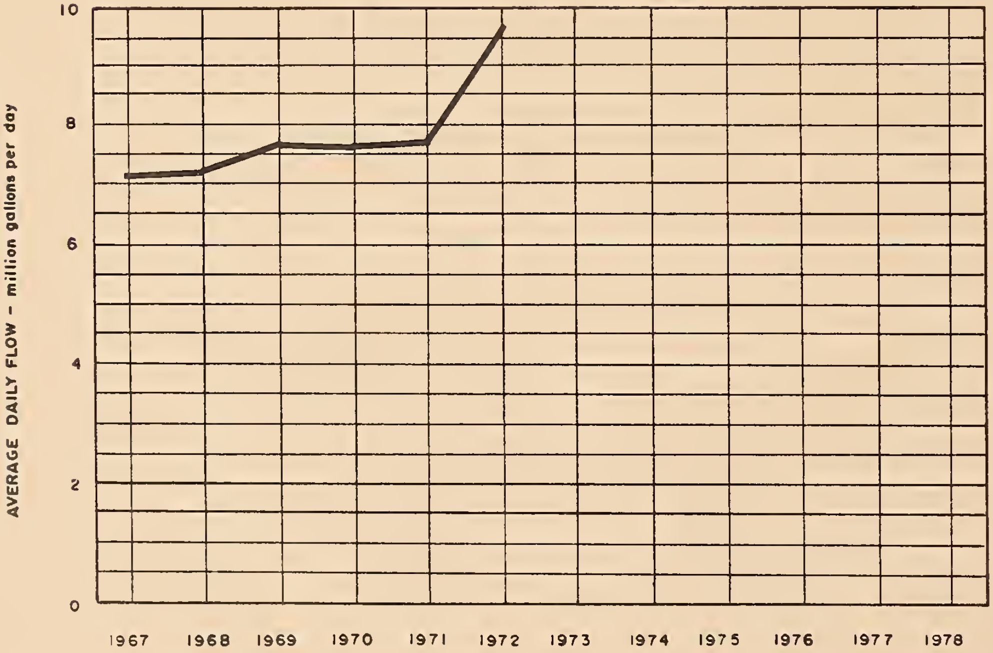
MONTH	TOTAL EXPENDITURE	REGULAR PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY*	WATER	TRAVEL
JAN	12234.76	11804.32					20.71		275.58	134.15		
FEB	15815.17	12711.72			2648.30		307.54		83.39	64.22		
MAR	33598.03	12541.04			2734.70	2444.00	1004.36		670.87	13915.68	287.38	
APR	21591.72	13155.61		117.58	2779.40		601.28		808.54	4101.56		27.75
MAY	17499.40	12189.26		342.39	2212.40		826.46	97.55	1486.39	52.60	292.35	
JUNE	36943.55	17595.21	470.59	770.94	2200.70		365.23		439.93	15091.45		9.50
JULY	5656.40	322.17		323.23	2515.70		734.79	110.17	1140.04	162.60	347.70	
AUG	17235.15	12208.54	372.38		2158.40	1328.20	418.14	205.70	545.85	(2.06)		
SEPT	18170.45	13336.83	398.94	116.41	2629.10	(50.00)	392.71	265.50	643.71	118.47	287.38	31.40
OCT	19590.08	13431.16	296.54	115.31	3133.40	1369.20	313.39		817.92	113.16		
NOV	21668.10	638.73			3350.60		624.01	22.17	360.58	16384.63	287.38	
DEC	58566.26	46223.98	671.43	820.45	6060.40	1504.52	966.31	134.30	3324.23	861.08	287.38	269.10
TOTAL	281125.99	166158.57	2209.88	2606.31	32423.10	6595.92	6574.93	835.39	10597.03	50997.54	1789.57	337.75

Brackets indicate credit.

PROCESS DATA

FLOWS



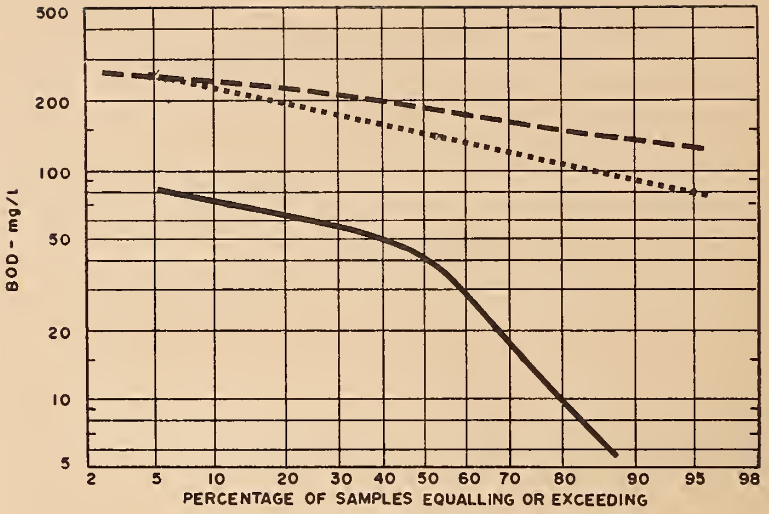


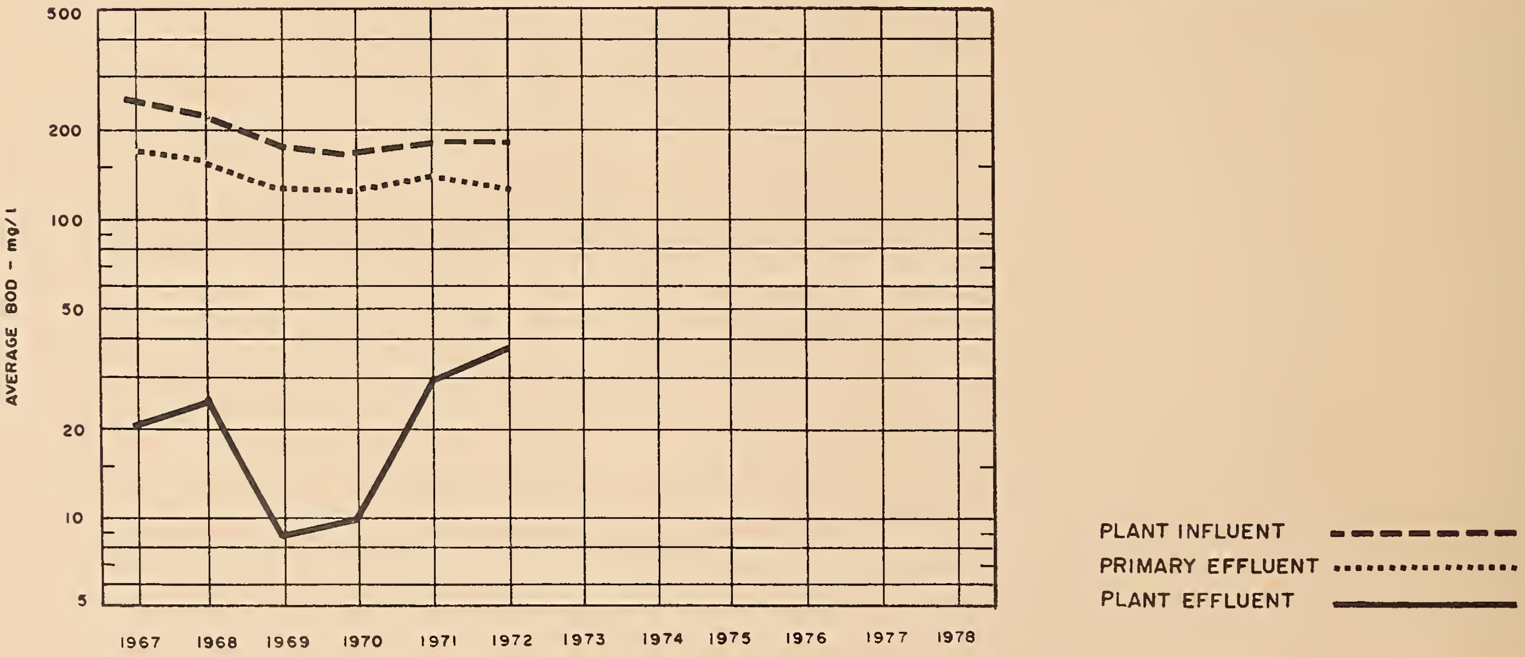
DESIGN CAPACITY — — — — — — —

PLANT PERFORMANCE

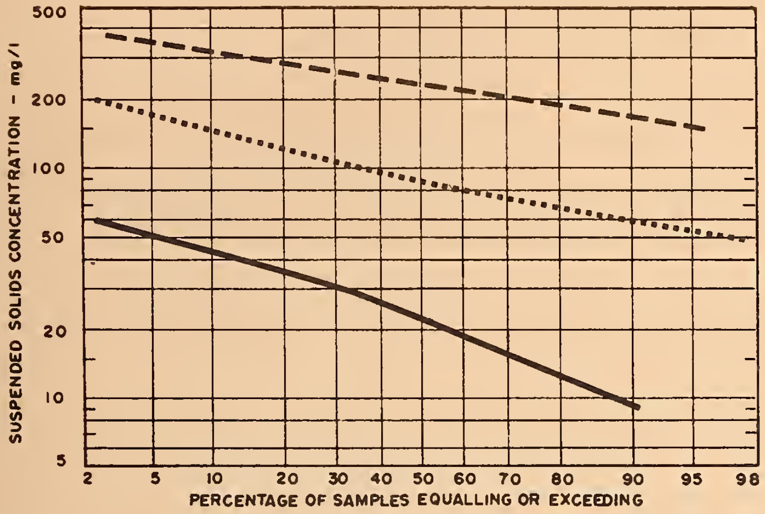
MONTH	FLOWS			BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				PHOSPHORUS	
	TOTAL FLOW	AVERAGE DAY	MAXIMUM DAY	INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT
	million gallons	mil. gal	mgd	mg/l	mg/l	%	10^3 pounds	mg/l	mg/l	%	10^3 pounds	mg/l P	mg/l P
JAN	241	7.8	8.9	168	40	76	308	221	36	84	445	7.2	5.8
FEB	222	7.6	8.8	184	49	73	299	228	29	87	441	7.3	5.9
MAR	329	10.6	13.5	154	58	62	315	198	26	98	565	4.5	4.8
APR	345	11.5	20.0	169	73	57	328	184	42	77	490	5.8	3.9
MAY	329	10.6	13.1	200	71	65	424	227	42	81	608	6.7	4.9
JUNE	291	9.7	11.7	236	46	80	553	248	29	88	637	5.0	4.1
JULY	279	9.0	11.6	173	13	92	446	233	12	95	616	6.0	4.6
AUG	307	9.9	12.5	110	9	92	310	245	12	95	715	5.4	2.1
SEPT	300	10.0	12.1	207	15	93	576	261	22	92	717	6.0	3.5
OCT	279	9.0	11.0	219	10	95	583	257	10	95	678	8.8	4.8
NOV	282	9.4	12.8	205	12	94	544	276	24	91	711	6.8	5.4
DEC	294	9.5	12.4	176	11	94	486	226	18	92	612	6.0	3.5
TOTAL	3498	-	-	-	-	-	5635	-	-	-	7877	-	-
AVG.		9.6	MAXIMUM 20.0	185	37	80	470	233	25	89	656	6.3	4.6
No. of Samples	-	-	-	65	65	-	-	229	229	-	-	17	17

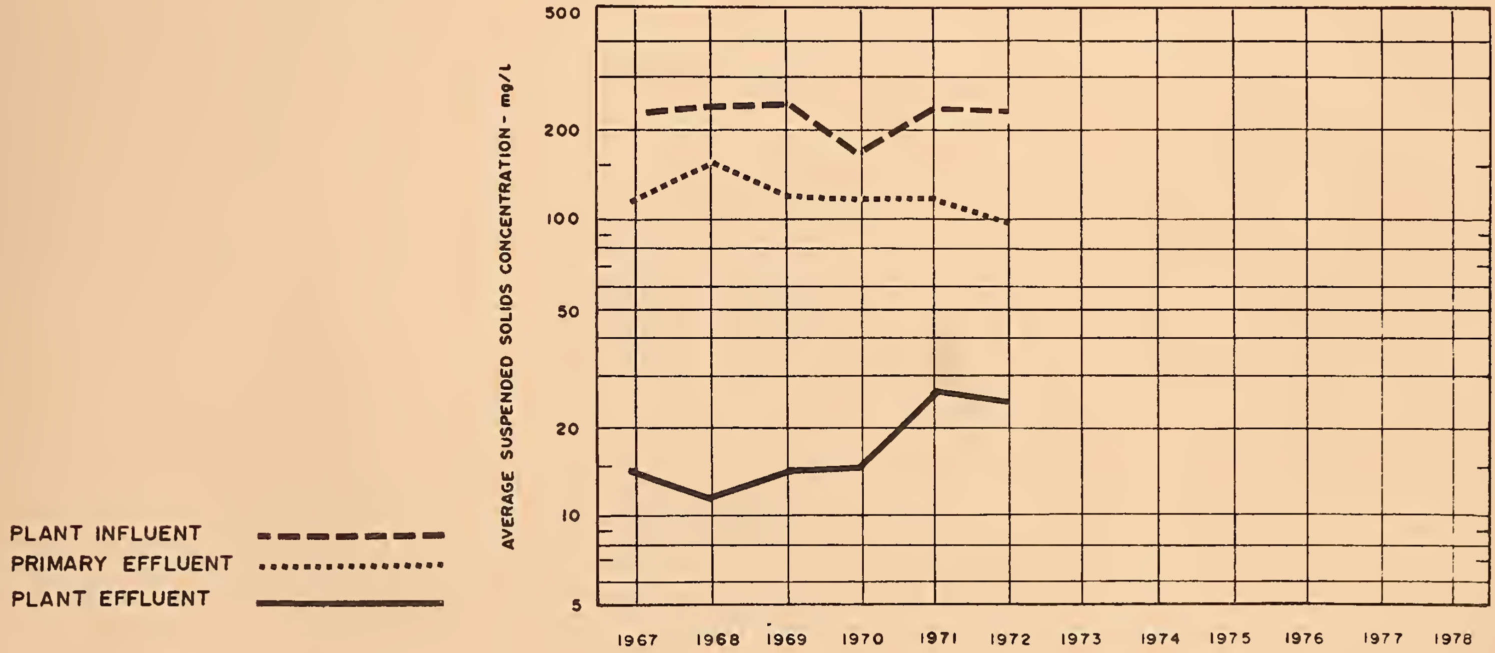
BIOCHEMICAL OXYGEN DEMAND



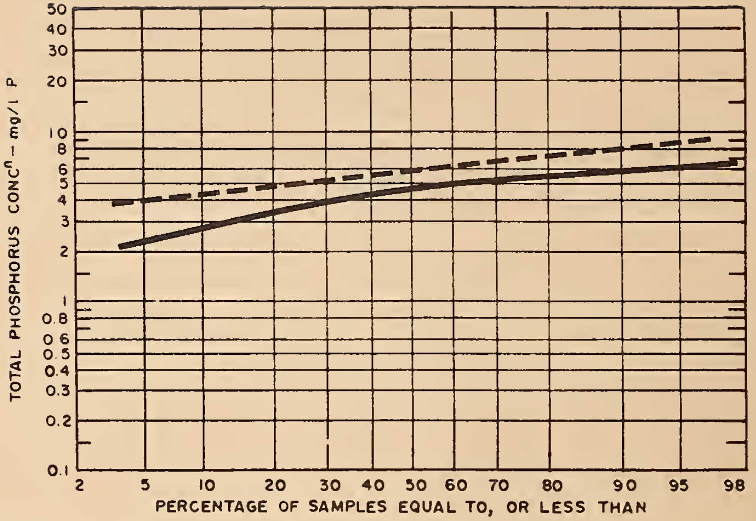


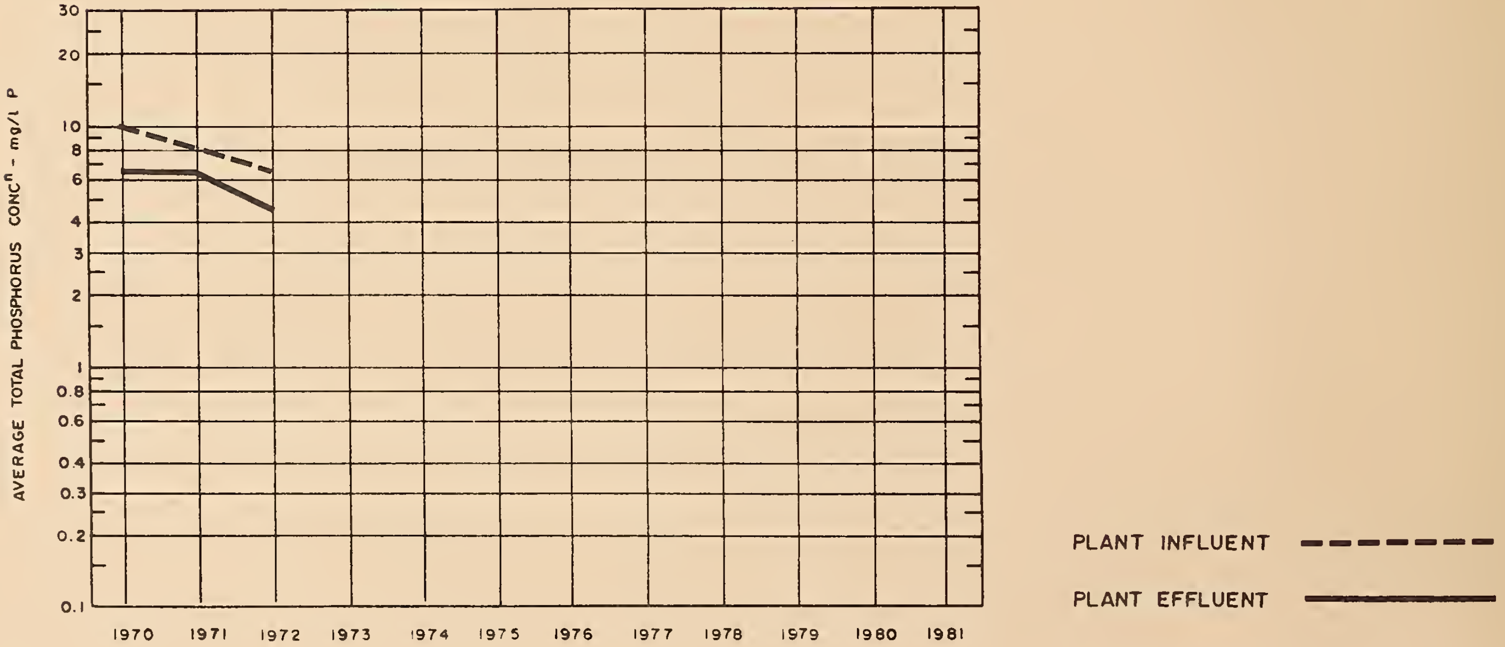
SUSPENDED SOLIDS





PHOSPHORUS

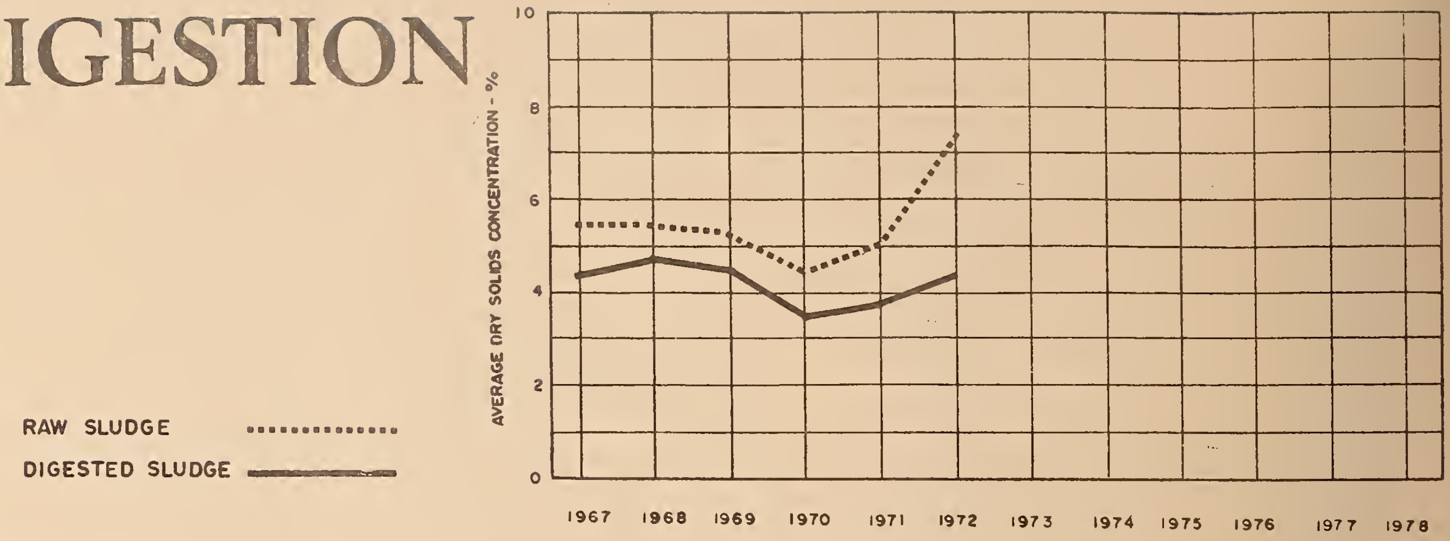

TOTAL PHOSPHORUS CONCⁿ - mg/l P
50
40
30
20
10
8
6
5
4
3
2
1
0.8
0.6
0.5
0.4
0.3
0.2
0.1
2
5
10
20
30
40
50
60
70
80
90
95
98
PERCENTAGE OF SAMPLES EQUAL TO, OR LESS THAN

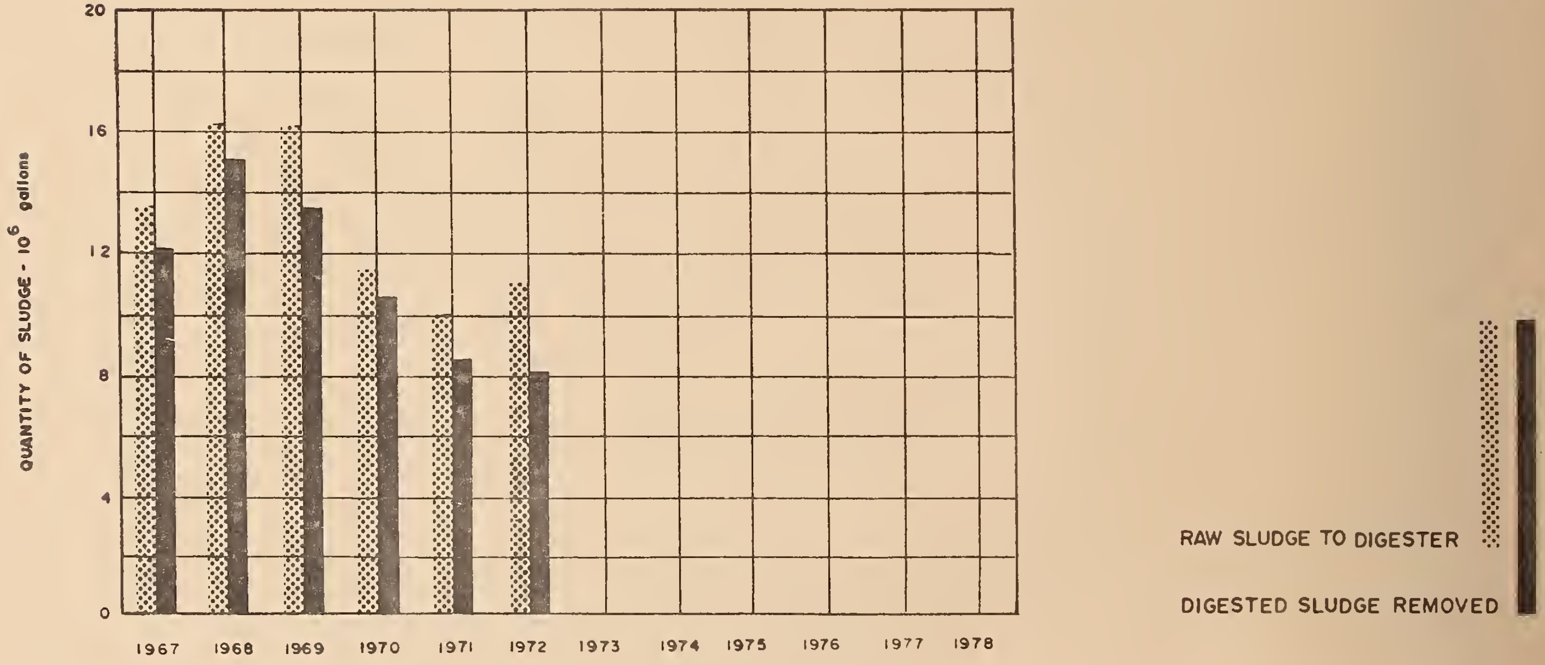

AVERAGE TOTAL PHOSPHORUS CONCⁿ - mg/l P
30
20
10
8
6
4
3
2
1
0.8
0.6
0.4
0.3
0.2
0.1
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
PLANT INFLUENT
PLANT EFFLUENT

TREATMENT DATA

	GRIT	CHLORINATION		PRIMARY EFFLUENT		AERATION			SLUDGE DIGESTION and DISPOSAL							
									RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT	
MONTH	QUANTITY REMOVED cubic feet	Cl_2 USED 10^3 pounds	AVG. DOSE mg/l	BOD mg/l	SUSPENDED SOLIDS mg/l	MLSS CONC mg/l	F/M day^{-1}	AIR $\frac{1000\ ft^3}{lb\ BOD}$	QUANTITY 10^3 gallons	TOTAL SOLIDS %	VOL. SOLIDS %	QUANTITY 10^3 gallons	TOTAL SOLIDS %	VOL. SOLIDS %	T. S. %	AMOUNT HAULED cubic yards
JAN	627	8.5	3.5	144	118	2140	.32		669	5.8	78	326	3.6	68	.9	1934
FEB	440	9.0	4.1	157	118	2660	.27		552	7.8	77	470	4.3	67	.7	2784
MAR	541	10.8	3.3	137	109	2830	.34		1021	8.7	75	961	3.7	67	.4	5702
APR	456	9.9	2.9	152	157	2910	.36		722	11.6	72	237	4.1	69	.5	1407
MAY	375	11.0	3.3	115	102	2350	.31		1441	9.7	74	447	4.1	67		2651
JUNE	413	9.2	3.2	120	69	2190	.32		803	7.5	74	770	3.9	70		4563
JULY	585	6.2	2.2	105	71	2390	.12		995	5.9	75	907	4.8	73		5384
AUG	684	13.1	4.3	55	63	2220	.07		996	9.9	55	730	5.2	59	.6	4330
SEPT	702	8.9	3.0	121	81	2920	.13		940	6.9	66	1000	5.5	55		5934
OCT	500	9.5	3.4	151	75	2620	.16		1001	4.9	73	996	4.2	59		5913
NOV	521	9.5	3.4	149	84	2490	.17		944	4.5	79	658	3.0	71		3906
DEC	436	9.3	3.2	125	82	2510	.14		902	4.7	75	842	2.8	65		5204
TOTAL	6380	114.9	–	–	–	–	–	–	10986	–	–	8144	–	–	–	49712
AVG.	1.8 cu. ft/mil gal	9.6	3.3	136	95	2520	.23		915	7.3	73	679	4.3	66	.6	4143

DIGESTION


RAW SLUDGE
DIGESTED SLUDGE
AVERAGE DRY SOLIDS CONCENTRATION - %
10
8
6
4
2
0
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978


QUANTITY OF SLUDGE - 10^6 gallons
20
16
12
8
4
0
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
RAW SLUDGE TO DIGESTER
DIGESTED SLUDGE REMOVED

Ontario. Ministry of
the Environment.
Project Operations Br.
TD 227/B73/W37/1972/MOE
Brantford Water
Pollution Control Plant.
1972

DATE	ISSUED TO
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TD227/B73/W37/1972/MOE
Ontario Ministry of the En
Brantford water
pollution control asgg
c.1 a aa

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TD
367
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B736
1972

Brantford : water pollution
control plant.
81591